Female labour force participation in Ghana: The effects of education

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Abstract

To participate in the labour market or not to participate appears to be an issue of survival for women in the Ghanaian economy. Parallel to the rising trend in female participation rates, there has been a tendency towards a decline in fertility. At the core of these patterns has been the schooling factor. This study uses data from the Ghana living standards surveys with demographically enriched information to estimate female labour force participation and fertility models. We find that female schooling matters in both urban and rural localities; both primary and post-primary schooling levels exert significant positive impact on women's labour market participation, and have an opposite effect on fertility. We conclude that although the gender gap in education has become narrower over the years, it is important for government policy to ensure the sustainability of the female educational gains obtained. Arguably, this is the key mechanism for enhancing female human capital and productive employment with favourable impacts on perceptions of ideal family size and fertility preferences.

1. Introduction

Labour market outcomes in Ghana, like elsewhere, wield a great impact on the quality of life of workers in general and women in particular as well as their families. It is common knowledge that gender differences tend to occur in the extent, forms and strategies for participation in the labour market. Indeed, the formal segment of Ghana's labour market could be said to be male-dominated because employment in that sector is contingent on participants' education and skill acquisition, among others, requirements that tend to be met more by males than females for various reasons (notably financial, institutional and cultural).

The distribution of the labour force in the formal sector of the Ghanaian economy shows that women generally occupy lower and middle strata at their work places. Occupational groups in the 1980s were such that in the administrative and managerial positions only 9% were women, while among clerical, sales and service workers, there were 75% women. Thus women form over two-thirds of employees in the lower stratum of the public sector and less than one-tenth of employees in the upper stratum. Under structural adjustment, the redeployment exercises undertaken as part of the civil service reform programme were primarily targeted at employees at the lower echelons (i.e., the unskilled or semi-literate), the majority of whom were women. This and other developments have made females a particularly vulnerable group.

Female labour force participation, although pervasive in the informal sector, tends to show an overall increasing trend in recent times. In all geographical locations (i.e., urban and rural), women are seen in active participation in the labour market. To participate or not to participate appears to be an issue of survival, an occurrence that seems to be driven primarily by such factors as education and cost of living. Parallel to this trend has been a tendency towards fertility decline. Together, these phenomena appear to be strengthening the hitherto fragile and income deficient status of Ghanaian women.

What is the trend in the sector distribution of females? What are the factors accounting for the decline in fertility? Are these same sets of factors equally important for the observed behaviour in female participation rates? How relevant are these for the evolution of gender related as well as family sensitive policies? These, in essence, are the issues to be addressed in this paper. More specifically, the paper is driven by a fourfold objective: to analyse trends in participation rates, education enrolment and fertility levels in Ghana; to estimate a reduced-form model of female labour force participation in Ghana; to examine the factors accounting for fertility decline; and to consider implications for policy direction. We hypothesize that education positively

affects female labour force participation and negatively affects fertility. We also surmise that improvements in child survival rates reduce the total number of children born.

The paper is made up of seven sections. Section 1 is essentially an introduction, providing a broad perspective of the study as well as its motivation. The next section provides a survey of existing literature on labour force participation and fertility and the theoretical framework for the study. In Section 3, issues regarding methodology and models for estimation are discussed. Section 4, which focuses on the Ghanaian setting, provides trend analyses in education, labour participation and fertility. Then in Section 5, data for the study are described. The discussion revolves around sources of data and a description of the sample. The econometric aspects of the paper start in Section 6, where we present model results and interpretations of these. The analyses of these results reflect not only the direction and magnitude of impact of such variables as education on female participation and fertility, but also the intuition behind the observed relationships. The final section of the paper provides conclusions as well as policy implications arising from the empirical estimations.

2. Literature survey and theoretical framework

There is a large literature on labour markets and related issues in general and gender aspects in particular. Similarly, theoretical frameworks on female labour force participation and fertility abound in the literature. This section traces some of the developments in these areas that are especially relevant to this study.

Literature survey

The results from the many studies on gender aspects of labour market issues have been quite insightful. Fosu (1999), Lam and Duryea (1999), van der Klauw (1996), and Sprague (1988) have touched on issues revolving around labour force participation, fertility and schooling decisions. Meanwhile, Mammen and Paxson (2000) have looked at the linkages between women's work and development, while others like Collier et al. (1994) and Edwards and Edwards (1994) have focused on a wide range of labour issues within the context of structural adjustment.

Fosu (1999) concludes that cost of living is non-extraneous within the labour force participation model and that it exerts a positive impact on the latter. Moreover, the apparent willingness of married women to participate in the labour force stems from a desire to provide their families with a higher standard of living. This finding is important since it underscores the welfare improvement rationale for female labour market participation.

Lam and Duryea (1999) use data sets from the Brazilian economy to explore the effects of schooling on fertility, labour supply and investments in children. They observe that the impact of schooling on the relevant variables could theoretically be conceived of as being driven by trade-offs along two margins. In the first of these margins is the race between home productivity and labour market productivity, which invariably gives direction to the extent to which better educated women are drawn into the labour force by higher wages. The second margin revolves around the adjustment that has to be made in terms of child quantity and quality that result from the effects of schooling on home productivity. Lam and Duryea point out that although some prediction ambiguity exists regarding these relationships, economic theory suggests that a simultaneous consideration of the effects of schooling on fertility and labour supply as well as on wages and investments in children could be more revealing than focusing on a single outcome. The authors find that women's first eight years of schooling exert a strong negative impact on fertility. Labour force participation of wives, however, shows little responsiveness to schooling of either spouse until around eight years of

schooling. These authors conclude that the apparent effects of schooling in both the fertility and the labour force participation regressions may pick up effects of omitted variables in the models, an assertion that is confirmed subsequently by reduced schooling effects when additional variables are incorporated.

The World Bank (1995a), writing on demographics and labour supply, notes that although no direct link exists between economic development and women's labour force participation, rapid development is often accompanied by higher female participation, higher levels of schooling for girls and lower fertility rates. In this context labour market conditions are also relevant. For example, migration reduces the domestic supply of male labour, inducing the entry of women into the labour force. Also, the economic downturn of the 1980s had an impact on women's participation, which tends to rise with recessions in low-income countries. Mammen and Paxson (2000), on the other hand, show that although the participation of women in the labour force first declines and then increases with income levels, higher income is unambiguously associated with a higher participation of women who receive wages and a reduction in the total fertility rate. Using a single cross-section of data from 1985, the authors show a "u-shaped" relationship between income levels (i.e., GDP per capita) and female labour participation rates.

On labour market demographics, Mackellar and Bird (1997) note that demography and labour force participation are inextricably linked and should therefore be considered together. From their perspective, what happens to fertility affects women's labour force participation and vice-versa. They observe that in less developed countries, ageing is increasing the size of the labour force: the proportion in the middle age group remains constant and population is redistributed, statistically speaking, from the under-15 age group, where labour force participation is very low, to the 60-plus age group, where labour force participation is substantial, especially in countries with low incomes.

On women's participation in the labour market, the World Bank (1995b) intimates that the decision not to participate in the labour force does not necessarily reflect a woman's own choice, nor does it always correspond to the optimum use of household resources. Furthermore, the market wage does not take cognizance of the social benefits of educating and hiring women. Discrimination in households and in the market carries not only private costs for individuals and households, but social costs for society as well. Dwyer and Coward (1992), however, observe that women as heads of households have assumed the role of providing income as well as other resources for their households. Women, who have largely been the principal caregivers, are playing an increasing role in the labour market and have become particularly vulnerable to the stresses inherent in juggling the demands of family and work responsibilities.

Addison (1993), on his part, observes that female labour force participation is, on average, lower than that of males because women have lower opportunity costs of non-participation when their wages are low. Unemployment rates are often higher among women because their opportunity costs of job search are low and discrimination in hiring leads to a lower job-opening rate for them.

Schultz (1994), writing on human capital, family planning and their effects on population growth, finds evidence at the household level suggesting that fertility and child mortality are related to such factors as women's education and family planning.

In such models of family resource allocation and behaviour, women's educational attainment and family planning programmes are seen to result in reductions in fertility as well as in child mortality. Drawing from the work of Strauss (1993), he notes that beyond the observed factors are other critical variables for mortality consideration, among which is nutritional status. Summarized by the available calories, nutrition especially at very low levels of income is associated with decreases in mortality. In an earlier work on fertility, Rosenzweig and Schultz (1985) point out that fertility within the household is determined by the dynamic interaction between its supply of and demand for births, and variations in birth across households reflect exogenous inter-couple differences in both the supply of births and the prices, income and preferences for children or demand.

Theoretical framework

The various dimensions of fertility and labour force participation, as surveyed in the literature, provide a basis for a theoretical framework. McCabe and Rozenzweig (1976) examined this relationship using a one-period static life cycle model initially applied by Ben-Porath (1973) and Willis (1973). Rozensweig and Wolpin (1980) then formulated a multi-period optimization model that incorporates two notions central to the literature on fertility and life cycle labour supply: a production function for child services and an inter-temporal relationship between earnings capacity and labour supply. In a similar analysis Sprague (1988) used a four-period framework in which children can only be produced in the first two periods.

Generally, the essence of the choice of the framework period depends on how much past behaviour as well as expected or future developments are envisaged to influence female participation and fertility. In this study, we adopt a one-period static model. The woman's utility is a function of the number of children (c), which has been adjusted for quality, consumption of market goods (x), leisure (v) and taste (t) (i.e., $U = U[c, x, v, t]$). The woman is assumed to maximize a well behaved twice differentiable utility function subject to a time allocation constraint and an income budget constraint.

In terms of fertility, theory indicates that lifetime demand for births is predicated on various socioeconomic factors (Benefo and Schultz, 1996). Notable among the factors affecting fertility (F) are the woman's productive opportunities (P) (which could be perceived as being primarily determined by her educational attainment [E]), her household's non human-capital assets (A), the survival rate of her children (S) and her social environment (i.e., locality, ethnicity and religion) (Ainsworth et al., 1996; Montgomery et al., 1995). Increases in the schooling of women enhance their probability of participating in the labour market if and only if the schooling causes a larger increase in their market wage than in their reservation wage (Lam and Duryea, 1999).

The decision to participate reflects a comparison between gains from market earnings and the opportunity costs in terms of forgone household production in child care and in other activities for a given level of household income from all other sources.

The possibility of increased income from other sources has a tendency to induce the relative gains from market participation (Wolfe et al., 1982; Heckman, 1974). Fosu (1999) re-echoes the fact that a woman's decision to participate in the labour force is basically related to her expected market wage and shadow price of time. Human capital models and related theory suggest that female labour force participation (*L*) is influenced by women's productive opportunities as reflected by their level of education (*E*), their non human capital assets (*A*), the presence of children and/or the child survival rate (*S*), and their social environment (*T*).

Thus, economic theory suggests that female labour force participation and fertility are decision variables that are jointly determined by a common set of exogenous variables (McCabe and Rosenzweig, 1976). The models for female participation and fertility could be written as follows:

$$L = l(E, A, S, T)$$
$$F = f(E, A, S, T)$$

where *E, A, S* and *T* are as defined above.

Women's education is generally expected to have a positive impact on labour market participation, and at the same time to reduce the number of children born to the woman. This essentially derives from the high opportunity cost of having many children and not participating, after having acquired higher education.

The direction of impact of a woman's non human capital, i.e., assets, on fertility and participation, are somewhat uncertain. Improvement in the child survival rate implies a reduction in the child mortality rate. Therefore the contraceptive effect of breast feeding can, on average, be maintained for longer periods. This results in a reduction in fertility and is further reinforced by the "insurance effect" whereby in the presence of low child survival rates, parents may have more births than they otherwise might have had (Montgomery et al., 1995). On the other hand, improvements in child survival will most likely have a positive effect on female participation, since with fewer children, women will be better positioned to avail themselves for work outside the home. The presence of older children is expected to encourage female participation since women are likely to get help in home production activities. Similarly, fewer children are envisaged to encourage female participation.

The effects of the woman's social environment, as proxied by her residence, ethnicity and religion, on fertility and labour participation could be ambiguous. However, urban residence is believed to be associated with various factors that help in reducing fertility and increasing a woman's participation rate. It must be noted, nevertheless, that a two-way effect could emerge from urbanization. There is a tendency for urbanization to increase women's opportunity cost of time by providing better earning possibilities as well as to reduce the cost of child quality by providing easier access to schooling. In a sense, therefore, the overall effect of urban locality on female labour participation and fertility could be said to be more of an empirical issue.

3. Methodology and models for estimation

Existing analytical approaches have been used to investigate the various issues under consideration. Depending on the particular objective being addressed, a specific methodology has been applied. The first objective of examining the pattern of formal sector industrial participation using a public–private decomposition criterion has been pursued with a more conventional approach (i.e., trend analysis). Using time series data spanning 1975 through 1991, the analysis involved the use of graphical representations to show trends over time coupled with verbal descriptions adducing reasons for the prevailing trends.

The methodology for objectives two and three of the study involve estimation of reduced form specifications for female labour force participation and fertility. We assume that the covariates are exogenous and also that the error term, which captures all unobserved variables, is uncorrelated with any of the right-hand-side variables. Since reduced form equations have no inherent simultaneity, they do not violate the classical assumption of non-correlation between explanatory variables and the stochastic term.

Female labour force participation is estimated via probit and multinomial logit techniques. Prior to estimation of each of the models, descriptive statistics of the variables in our micro/household survey data set are provided. We first estimate a model of labour force participation using a probit model. This is more of a baseline model estimation and it ignores all occupational differences. The major interest here is to find out in a more generic sense what factors explain women's decision to participate in the labour market. Of major interest is the role played by school completion. The coefficients obtained in our probit estimation or results only serve to provide a sense of the direction of the effects of the covariates on participation in the labour market, and cannot be used for magnitude of impact analysis. To examine the magnitude of impact, we calculate the marginal impact of these right-hand-side variables on the probability of participation. The probit model we estimate is of the following form:

$$Y^*_i = X_i B + u_i \text{ , } i = 1,.....,n$$
$$Y_i = 1 \text{ if } Y^*_i > 0$$
$$Y_i = 0 \text{ if otherwise}$$

where Y_i is a binary response indicator of the *ith* individual determined by the underlying latent variable Y^*_i and X_i is a row vector of explanatory variables, while B is a vector of unknown parameters to be estimated and u_i is the error term.

The labour force participation model to be estimated is done for the entire sample, after which a decomposition is pursued along locality dimensions (i.e., rural vs. urban). Strauss and Thomas (1995) have pointed out that in a reduced form model with no measures of household resources, part of the effect of education will reflect the role of income. This notwithstanding, empirical literature supports the notion that even after controlling for resources, parental education in general and that of mothers in particular has persistent effects. We therefore incorporate an asset variable to capture household resources to see the difference this makes in terms of both the sign and the magnitude of education coefficients in our separate models. In estimating our baseline empirical probit model, labour force participation (*L*) will take the form:

$$L = l\,(FE, A, A^2, HA, N, S, D, E, R, M, HE)$$

where *FE, A, A^2, HA, N, S, D, E, R, M* and *HE* are woman's level of schooling completed, age, age squared (to capture non-linear effects), household assets, non-labour income, presence of children, woman's residence, ethnicity, religion and marital status, and husband's education level, respectively. We acknowledge that endogenous variables, like number of children in the labour force participation model, would lead to simultaneity bias by virtue of the fact that theoretical models on labour force participation and fertility emphasize that these outcomes are jointly determined by women or their family. Moreover, in pure reduced-form models such endogenous outcomes are excluded from the right-hand-side variables. Therefore, we first estimate our model without any children variables (i.e., in a pure reduced form sense). However, because we are interested in the effects of children on women's participation we include such variables and re-estimate a second model. Our data make it impossible to find instruments for fertility, and therefore such an approach is not pursued. By estimating both true reduced form models on female labour force participation and models with children variables, we are able to assess the robustness of schooling, age and income coefficients to the modified specifications.

We then estimate a multinomial logit model on employment choice. There are three main employment categories or outcomes (*Y*), coded as follows:

1 = Wage employment
2 = Self-employment
3 = Unpaid family worker

In the multinomial logit regression, given a vector of independent variables (X), a set of coefficients $\hat{a}_1$, $\hat{a}_2$and $\hat{a}_3$, which correspond to each outcome category (*Y*), is estimated as follows:

$$\text{Prob}(Y = 1 \mid X) = e^{X\beta 1} \div (e^{X\beta 1} + e^{X\beta 2} + e^{X\beta 3})$$

$$\text{Prob}(Y = 2 \mid X) = e^{X\beta 2} \div (e^{X\beta 1} + e^{X\beta 2} + e^{X\beta 3})$$

$$\text{Prob}(Y = 3 \mid X) = e^{X\beta 3} \div (e^{X\beta 1} + e^{X\beta 2} + e^{X\beta 3})$$

Such a model has more than one solution to $\hat{a}_1$, $\hat{a}_2$ and $\hat{a}_3$, which leads to the same probabilities for *Y=1, Y=2* and *Y=3,* and as such is regarded as being unidentified. As observed by Sloane and Theodossiou (1996) and Stata Corporation (2001), one of the $\hat{a}_1$, $\hat{a}_2$ and $\hat{a}_3$ must be arbitrarily set to zero for the model to be identified. If $\hat{a}_3$ is set to zero, and this is what we do, then the coefficients $\hat{a}_1$ and $\hat{a}_2$ measure a relative change with respect to $\hat{a}_3$ and the model thus becomes:

$$\text{Prob}(Y = 1 \mid X) = e^{X\beta 1} \div (e^{X\beta 1} + e^{X\beta 2} + 1)$$

$$\text{Prob}(Y = 2 \mid X) = e^{X\beta 2} \div (e^{X\beta 1} + e^{X\beta 2} + 1)$$

$$\text{Prob}(Y = 3 \mid X) = 1 \div (e^{X\beta 1} + e^{X\beta 2} + 1)$$

The relative probability of, say, *Y=1* (i.e., formal wage employee) to the base category or comparison group of *Y=3* (i.e., unpaid family worker) gives the relative risk ratio and is obtained as:

$$\text{Prob}(Y=1) \div \text{Prob}(Y=3) = e^{X\beta 1}$$

With three occupational choices and using one as the base alternative, our multinomial logit model has a system of two equations. We test our hypothesis about the coefficients on the respective sector model with a Wald test, which enables us to determine whether there is any justification for the sectoral decomposition of the labour market underlying the multinomial model.

In the case of fertility, following Lam and Duryea (1999) and Montgomery et al. (1995), we define fertility in one sense as cumulative fertility where the focus is on the total number of children born. For this definition we estimate our reduced form equation for married women using ordinary least squares techniques. Our specification is as follows:

$$F = f(FE, A, A^2, HA, S, D, E, R, HE)$$

where *FE, A, A^2, HA, S, D, E, R* and *HE* are woman's level of schooling completed, age, age squared (to control for biological factors affecting the supply of births), household assets, child survival rate, woman's residence, ethnicity, religion and husband's education level, respectively. We then re-estimate the fertility model with an instrumental variable technique (i.e., two-stage least squares) and apply the Hausman test to test for the exogeneity of the child survival rate variable.

The methodology for the final objective of deriving policy implication is more of a descriptive approach, blending empirically obtained results with some logical and analytical circumspection.

4. The Ghanaian setting

The discussion here relates to Ghanaian trends in educational attainment, employment and fertility, and the interplay among the three. Educational achievement is increasing over time, while fertility is decreasing, albeit slowly. Employment is more problematic, and relates to overall economic growth and the impact of structural adjustment.

Educational attainment

From a trend perspective, the educational status of Ghanaians appears to be improving The gender gap in education, both primary and junior secondary school levels, has generally been getting smaller over the years. Like the typical pattern in sub-Saharan Africa, dropout rates beyond the primary level of schooling tend to be relatively higher for females than for males, a trend that has been attributed to various economic and socio-cultural factors, among others. The result has been a relatively larger gender gap beyond the primary schooling level. In 1975, there was a gender gap of about 13% for primary but 18% for junior secondary school level. By 1996, the gaps had fallen to 8% and 14%, respectively. The gross enrolment ratio for primary and secondary school combined rose from 62% in 1998/99 to 64% in 2001/02 for males, while for females these were 53% and 57%, respectively (UNESCO, 2004).

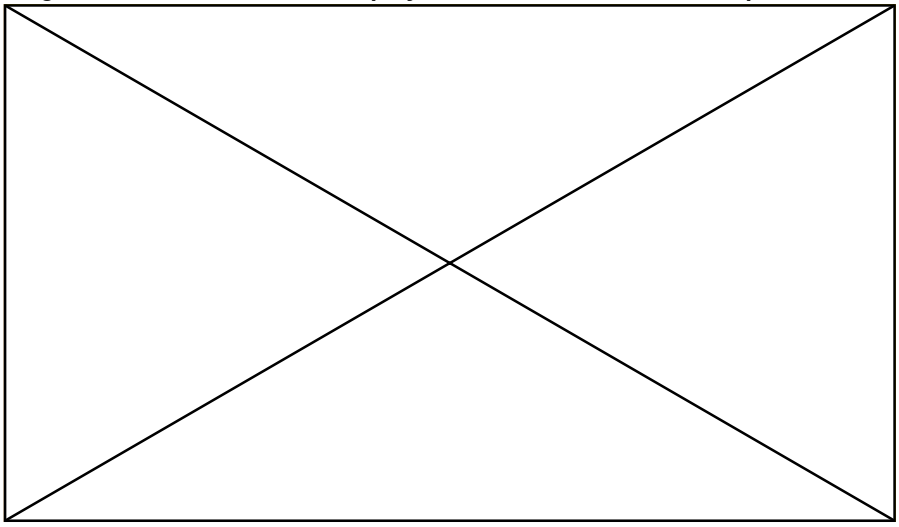
Among the various reasons for the reduction in the gender gap were the Government's policy of free basic education, the positive spillovers from educated mothers to their daughters and female education awareness campaigns. This observed pattern, given that it is sustained over time, means that more females are going to experience improvement in their educational status. Moreover, as more females get educated and acquire more skills, they will hopefully increase their employability in the formal labour market, with positive impact on their well-being and that of their families, other things being equal. Fertility preference is also likely to be affected, with a trend towards child spacing, relatively smaller family sizes and child quality.

Employment and fertility trends

The formal sector of Ghana's labour market could be defined as including all legally registered and organized or structured business units that employ ten or more workers. It is made up of both wage and salary earners and embodies both public and private sectors. This sector has witnessed much fluctuation in terms of its ability to

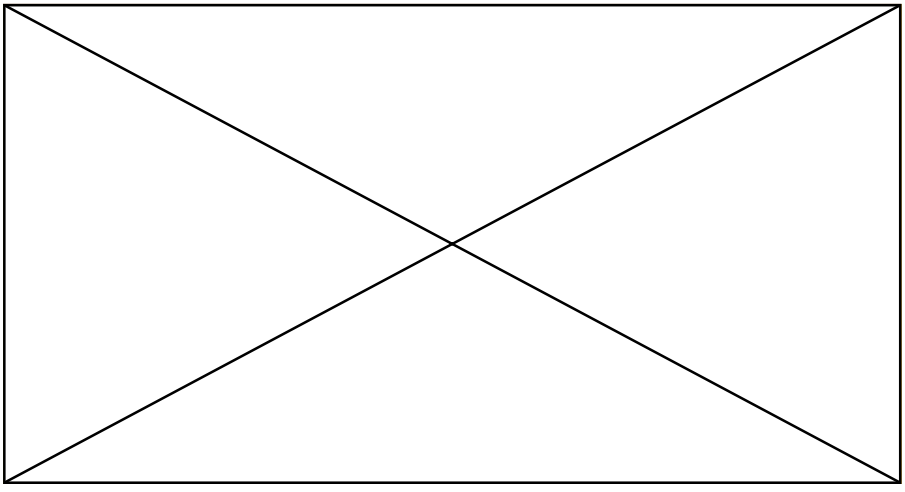
absorb labour market participants. As shown in Figures 1 and 2, a somewhat positive employment trend prevailed for the second half of the 1970s, followed by a declining trend during the early 1980s. This was the period of economic decline in the Ghanaian economy that eventually paved the way for the economic recovery programme starting in 1983. The movement towards economic recovery was associated with some sort of "employment recovery", so to speak, especially in the private wage sector. The second half of the 1980s through to the early 1990s was characterized by decline in the formal wage sector. Among various reasons for this pattern especially in the public sector are downsizing of the public sector (as reflected in the redeployment programme), divestiture programme and opening up the economy to competition.

Figure 1: Formal sector employment in establishments irrespective of size



Source: Ghana Statistical Service, *Quarterly Digest of Statistics*, various issues.

Figure 2: Formal sector employment ratios in establishments irrespective of size

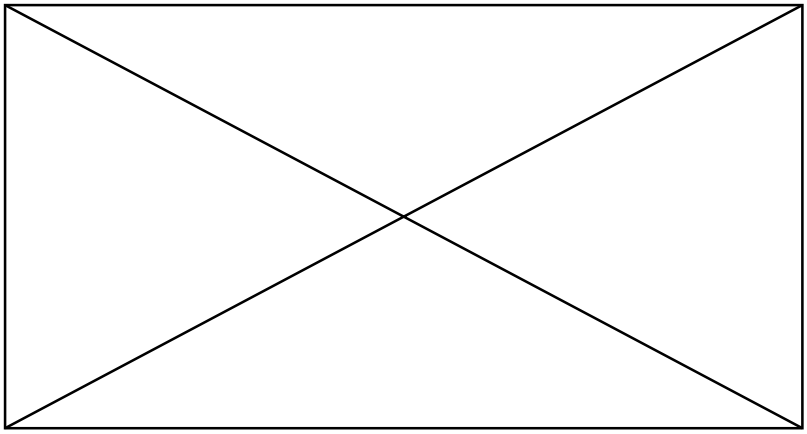


Source: Based on Ghana Statistics Services' *Quarterly Digest of Statistics*, various issues.

Despite the downward trend in employment in the formal sector, it must be pointed out that the private formal sector appears to provide a relatively larger avenue for formal employment, as shown by the upward pattern in its share of employment. This notwithstanding, the informal sector is the most important source of labour market participation. Figure 3 shows that the community and social services subsector tends to be the most important source of employment for the public formal sector, while the manufacturing subsector provides the bulk of employment for the private formal sector. These patterns of sectoral employment are quite similar to those in other sub-Saharan African economies. Owing to the unavailability of gender disaggregated data for these employment trends, we are unable to go beyond the observations above. However, we can call on household survey data to examine the prevailing gender pattern of participation in the informal sector.

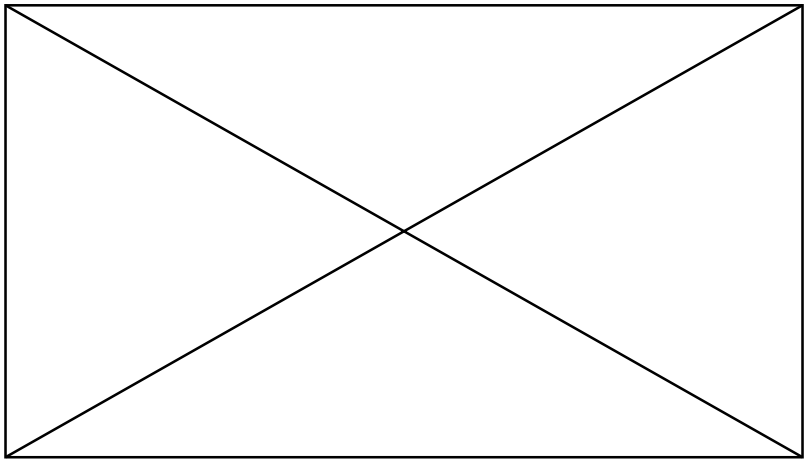
Figure 3: Formal sector employment shares

3a: Public sector shares



Source: Based on Ghana Statistics Services' *Quarterly Digest of Statistics*, various issues.

3b: Private sector shares



Source: Based on Ghana Statistics Services' *Quarterly Digest of Statistics*, various issues.

Evidence from the 1991 and 1998 household surveys shows that wage employment for females is no more than 10% of total employment. By far, agriculture is the dominant industry absorbing the female labour force. This is not surprising since Ghana is to a large extent a predominantly agricultural economy and the bulk of its populace resides in rural areas. Also, in the light of our sample size by location, with 59% being rural dwellers, there is a tendency for agricultural employment to dominate. This tendency notwithstanding, it is observed that agriculture's share of the female labour force dwindled from about 59% in 1991 to 51% in 1998. More and more females are currently participating in the manufacturing and trading industries. The gradual growth of micro enterprises and the provision of "appropriate technology" and functional literacy skills to both rural and urban groups have somehow opened an avenue for women's participation in manufacturing and food processing enterprises. The rise in participation in trading is not unexpected, since virtually anyone with a little start-up capital can engage in one form of retailing or another. Educational prerequisites are not too high, and at the same time there seem to be less severe "entry barriers", if any.

Fertility levels in the Ghanaian economy appear to be declining over time. World Bank (2001) estimates of the total fertility rate for Ghana put the number of births per woman at 6.5 in 1977. This fell to 5.5 in 1992, and by 1998 had dropped to 4.79. The interactions of sustained efforts at improving literacy levels, especially of the girl-child, the participation in labour market activities, the availability of better health care and the emergence of family planning services have all worked towards reducing the total fertility rate in the country. Improvements in the educational status of females (in terms of both enrolment and years of schooling), as well as the tendency for later marriage, have been crucial to fertility reductions. In Ghana, it is now a common occurrence to see women with post-secondary education marrying in their late twenties and early thirties. This higher age at marriage tends to be associated with a desire for smaller family sizes, as the possible number of children they can bear, given their fertility horizon, is reduced.

5. Data sources and description

The core data for our study are micro in nature and are from the 1998/99 Ghana Living Standards Survey (i.e., GLSS4) collected by the Ghana Statistical Services. This is supplemented by the GLSS3, which we use mainly for comparative analysis. The GLSS4 covered 22,122 people in a survey period spanning April 1998 and March 1999. Our sample size is 7,257, made up of both urban and rural females aged 15 years and above. Sixty-eight percent (68%) of these females are rural dwellers, while the remainder (32%) are urban-based. The GLSS3, which was carried out between September 1991 and September 1992, covered a representative nationwide sample of about 4,500 households with a total of 20,403 persons. We used a sub-sample of 5,612 females from this study, comprising those aged 15 years and above. Sixty-three percent (63%) of these females dwell in rural areas, the rest have urban residence.

The survey instruments and methodology used under the GLSS4 were based on those used for the GLSS3 with very minimal modification. Although it is usually difficult to compare results from different surveys, we are of the opinion that useful insights could be obtained from this exercise. Given the similarity in the survey instruments and survey administration by the same institution, as well as the fact that these are well laid out successive rounds of household surveys, some measure of comparison could be made. It is against this backdrop of institutional consistency that these data sets are being used.

A rich database is provided for fertility, prenatal care and contraceptive use. Specific information on fertility-related variables includes cumulative fertility (i.e., total number of children born), current fertility (i.e., currently pregnant, pregnant in the last 12 months and child alive), pregnancy end (i.e., whether live birth, stillborn, miscarriage or other), sex of children, and survival rate for both boys and girls. Data sets on labour force participation cut across both general and specific issues. Employment variables notably include type of work, occupation, nature of remuneration and characteristics of main occupation (i.e., main activity, employment status, hours worked for amount, secondary as well as tertiary occupations). There is also information on household asset ownership, which is decomposed into agricultural and non-agricultural assets. The educational data provide not just general education information but also educational career insights. Under the former are such variables as school attendance and highest educational qualification. As regards educational career, notable variables for which data exist include highest certification achieved, school type (i.e., private vs. public), tertiary education attainment and years, as well as type of tertiary institution attended. The household roster identifies the usual members of the household and has demographic data such as age, sex and marital status of members, among others.

Description of sample

Table 1 provides descriptive statistics for some of the pertinent variables in our data sets. Our focus is on the female segment of our sample, and as such the descriptive statistics provide such measures as the mean and standard deviation values of our key covariates. Most women tend to be middle-aged with the 1998 average age being 35.3 years and 37.5 years in urban and rural areas, respectively. These averages were higher than in 1991 by 1.8 years and 0.7 years for urban and rural women, respectively, and coincide with improvements in life expectancy rates in the country. The survival rate of children in urban areas exceeds that of rural areas by about 4 percentage points in both periods.

Labour force participation rates have risen for both urban and rural women, with a more rapid increase among urban women. The relatively lower participation rates in the early 1990s could be the direct result of the structural adjustment programme implemented in the late 1980s, which led to job displacements and very difficult times for the pursuit of economic activities, especially in urban areas. Female participants in the urban labour market experienced a participation rate of about 88% in 1998, while rural participation rate was 86%. These participation rates for urban and rural women were, respectively, 26% and 4% higher than those in 1991.

In terms of fertility, the average number of children born is roughly similar in both 1991 and 1998 (i.e., about three children for urban women and four for rural women). There appears to be a cohort effect at work, so that older cohorts tend to have more children than younger ones. This should probably be expected since older women would have had time to complete their fertility. Thus in 1998, the average number of children borne by urban women increased from 2.6 for age group 20–29 years to 3.1 for the age group 30–39 years, and to 4.4 for the age cohort 40–49 years. Corresponding numbers for rural women in these respective age cohorts were 3.2, 4.0 and 5.3. The 1991 data set also reflects similar cohort effects. For urban women the average number of children born rose from 2.7 through 3.5 to 4.8 for the respective age cohorts. These averages were relatively lower than those for rural women, who registered averages of 2.7, 4.1 and 5.9 for groups 20–29 years, 30–39 years and 40–49 years, respectively.

As is expected, urban and rural differences in education exist, with relatively more women in rural areas being without schooling. However, schooling attainments have improved in both urban and rural areas. About 29% of all urban women in 1991 had never ever been to school before (which is 6 percentage points above the 1998 situation) and 58% had post-primary schooling (which is 3.5 percentage points lower than the 1998 situation). In rural areas the percentage of women with no schooling fell from 56% in 1991 to 43% in 1998. For such women post-primary schooling attainments rose from 28% to 31%. For women with some schooling, there is a relatively higher incidence of middle school attainment compared with either secondary or university education attainments. For married women in both urban and rural localities, there is a gap between their own educational accomplishments and those of their husbands. This is not unexpected since the phenomenon of higher male schooling attainment is a common occurrence in the global economy. In both 1991 and 1998, there are more women with no schooling and primary schooling status than their husbands but fewer with post-primary schooling. This is true for both localities.

Table 1: Descriptive statistics for female sample aged 15 years and over

Variables	Pooled sample		Urban sample		Rural sample	
1998	**Mean**	**Std dev**	**Mean**	**Std dev**	**Mean**	**Std dev**
Woman's age	36.8	0.1	35.3	16.3	37.5	17.4
Household assets	34.3	311.5	60.5	456.1	21.2	202.7
Non-labour income	26.6	817.9	44.1	117.3	17.2	51.5
Female participation rate	86.9	47.1	87.9	50.0	86.4	42.4
Woman's education (%)						
None	35.9	48.1	23.1	42.4	43.1	49.5
Primary	24.5	36.7	22.3	37.0	25.8	36.5
Post-primary	39.6	45.5	54.6	43.5†	31.1	46.4
Husband's education (%)						
None	24.5	†43.1	13.7	35.0†	29.8	45.7
Primary	14.4	†29.9	10.6	37.0	16.2	31.1
Post-primary	61.1	†38.3	75.7	33.5	54.0	40.2†
Total children born	3.8	0.4	3.2	2.1	4.0	2.4
Child survival rate	89.4	19.7	91.9	19.0	88.3	19.9
Contraception use	11.9	32.3	12.8	33.4	11.4	31.8
Married	43.0	49.5	40.6	49.1	44.3	49.7
Akan ethnicity	52.7	49.9	53.5	49.9	52.3	50.0
Ga ethnicity	8.0	27.2	12.6	33.2	5.8	23.4
Ewe ethnicity	13.6	34.3	11.9	32.4	14.5	35.2
Hausa ethnicity	1.0	10.2	2.5	15.6	0.3	5.7
Sample size		7,257		2,418		4,839
1991						
Woman's age	35.6	16.5	33.5	15.4	36.8	17.0
Household assets	6.3	39.9	7.6	25.7	5.5	46.4
Non-labour income	3.9	15.4	6.7	22.5	2.3	8.7
Female participation rate	77.3	32.1	70.0	43.3	83.0	19.7
Woman's education						
None	46.2	49.9	28.9	45.4	56.0	49.6
Primary	15.0	30.6	13.0	28.5	16.0	31.6
Post-primary	38.8	43.2	58.1	49.4	28.0	35.6
Husband's education						
None	34.7	47.6	21.6	41.2	41.0	49.2
Primary	11.6	26.1	9.4	22.2	12.5	27.7
Post-primary	53.7	49.8	69.0	48.5	46.5	48.3
Total children born	3.7	2.4	3.4	2.2	3.9	2.5
Child survival rate	89.8	20.4	91.8	21.2	88.7	20.0
Contraception use	13.6	34.3	13.4	34.0	13.8	34.5
Married	57.3	49.5	51.1	50.0	60.7	48.8
Akan ethnicity	44.7	49.7	48.8	50.0	42.5	49.4
Ga ethnicity	9.6	29.4	16.4	37.1	5.6	23.1
Ewe ethnicity	12.6	33.2	12.9	33.5	12.1	32.6
Hausa ethnicity	1.7	13.0	3.8	19.2	0.5	7.1
Sample size		5,612.0		2,044.0		3,534.0

Note: Household assets and non-labour income are valued in 10,000 cedis; woman's age is in years; total children is number born; all other variables are in percentages.

The marital status of urban and rural women in 1998 shows that 41% and 44%, respectively, were married. A further exploration of the data reveals that about 10% of all women were either divorced or separated. About 11% were widows, while about one-quarter of the sample had never been married. There were, however, some women in some sort of loose union. Such informal relationships account for about 12% of women in our sample. To a large extent it could be anticipated that widows and divorced or separated women are likely to assume the role of household headship, and are therefore likely to be seen participating actively in the labour market. This is not to say that women in marital unions are not expected to participate, but given the socioeconomic environment under consideration, the inclination to participate on the part of those divorced and widowed, controlling for age and other factors, could be said to be relatively higher. The relationship between marital status and participation is an interesting one, and will be explored in the empirical section of the paper.

Unlike 1998, there were relatively more married women in the 1991 sample (i.e., 51% in urban and 61% in rural areas). Only 4% of all women were in informal relations in 1991, which was about one-third of what prevailed in 1998. It therefore appears that loose unions are gaining ascendancy, while formal marital unions are declining among Ghanaian women. The extent of divorce in 1991 was lower than 1998 by a percentage point.

Recent micro patterns on female participation and fertility

The female labour force participation rate, which we define to include both women who are employed and those who are unemployed but actively looking for work, is quite high for the country. The "employed" are defined broadly to include those working for either wage income or no income (or being paid in kind). Thus the "employed" embody three groups: formal wage sector, self-employment and unpaid family labour. This definition puts the overall female labour force participation rate at 86.9%, or 87.9% for urban women and 86.4% for rural women. In terms of age groups, participation rates are 83.9% for women aged 20–29 years, 88.3% for those aged 30–39 years, 91.9% for those between 40 and 49 years, and 88.3% for those aged 50 years and above. One reason for the rather high participation rates is probably related to the measurement of participation, which includes a large informal sector with nearly every woman engaging herself in one kind of economic activity or the other. Moreover, with an essentially rural economy, where agriculture is the dominant activity, it is not surprising to find almost every able-bodied woman working on the farm.

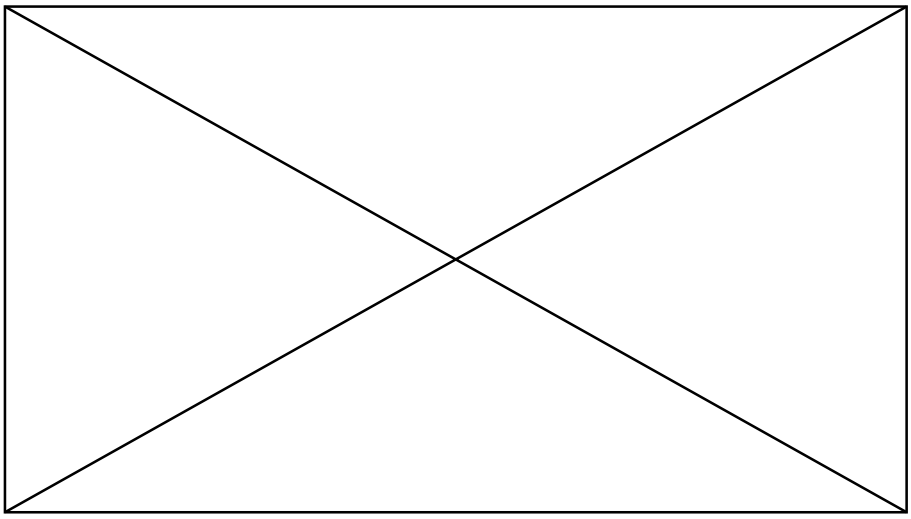
Other factors account for the observation of increasing participation rates for females. The education levels of females appear to be increasing, thus enabling women to participate more actively than previously (i.e., the opportunity cost of time seems to have gone up). Other factors accounting for the increased participation include the prevalence of a declining pattern in fertility, probably releasing women from the "stay-at-home-for-child's-sake" phenomenon. Another factor that has been cited is the cost of living, which in urban centres has tended to be relatively high in recent times, propelling women (and men alike) to participate in labour market activities. The spate

of awareness campaigns on female capabilities vis-à-vis those of males (being championed by some non-government organizations) could be another plausible factor for the observed pattern in participation.

In terms of employment choice, 10% of women in the 1998 sample were in wage employment, while 67% were self-employed. By way of contrast, wage employment and self-employment probabilities for men were 14% and 62%, respectively. There is the presence of unpaid family labour, as is typically the case in developing countries. For our sample, unpaid family labour constitutes about 23% of sampled women. There are more self-employed women in urban than rural areas, but more unpaid family labour in the rural areas. A decomposition of the self-employed category shows agriculture to be the predominant category; given that most women are located in rural areas where agriculture is the main economic activity, it is no surprise that this pattern of employment sector choice is observed. In urban areas where the cost of living tends to be relatively higher, there is increased self-employment activity with the hope of earning some income. Although help from family members is usually solicited in family enterprises, this appears not to be too high for females, leading to the observation of a relatively smaller number of urban females in the unpaid family labour category. A similar pattern was observed for the 1991 sample.

Figure 4 shows age-specific employment choices for women. Employment probability in the wage sector tends to show not much variability for women between 20 and 49 years, and is in the neighbourhood of 10%. Thereafter the chances for such wage-employment jobs decline. It is difficult for women over 50 years to compete for formal sector jobs. With the exception of isolated dips, a somewhat increasing employment probability for self-employment prevails for females as we move from younger age cohorts to older ones. On the other hand, employment probability for

Figure 4: Female employment probability by age group and sector (1998)



unpaid family labour falls from about 27% for women in their early twenties to 20% for those over 55 years. A plausible explanation for this pattern seems to be that as women mature, there is a need to earn income to supplement the family income (in the case of married women) or support the family (in the case of currently single women), thus a movement away from unpaid family labour. As to whether a woman ends up in wage employment or self-employment depends on various factors, notable among which is her education level. How does this education pattern interact with female labour force participation and fertility? The answer to this is somewhat provided by Table 2 and Figure 5.

In Table 2, we see that the woman's schooling level (i.e., none, primary, post-primary) tends to interact with employment sector choice in a unique way. For those with no schooling the hope of being employed in the formal wage sector is bleak, with an average of only about 5% managing to do so. Close to 65% of women without education are in the self-employment category, while 30% are in the unpaid family labour group. The prospect of formal sector employment is a little better for women with primary education. On average, 10%, 71% and 19% of them are in the formal wage, self-employment and unpaid family sectors, respectively. There is an improved situation for women with some post-primary schooling, with relatively fewer of them in the unpaid family labour category. For such women, wage employment probability is about 37% on average.

Table 2: Employment sector participation by woman's age and education (1998)

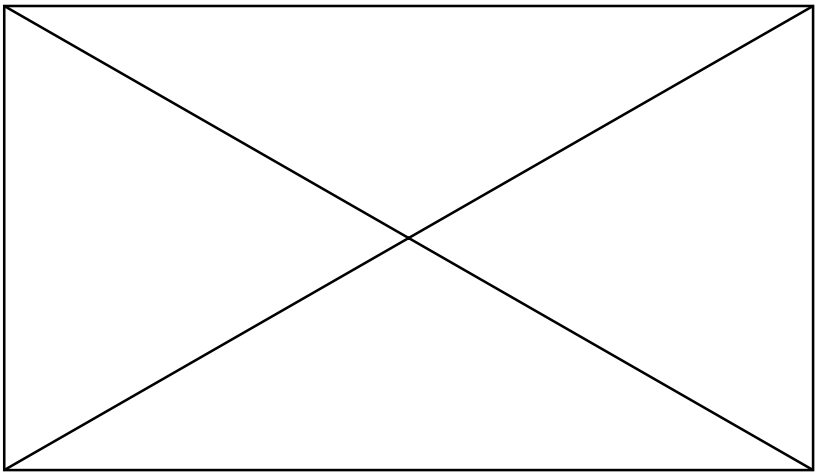
Education level	Employment type	Age group				
		20–29	30–39	40–49	50 plus	All ages
None	Wage employment	6.36	2.9	4.10	4.88	5.03
	Self-employment	66.82	72.46	74.59	78.05	64.83
	Unpaid family labour	26.82	24.64	21.31	17.07	30.10
Primary	Wage employment	7.55	5.69	11.64	6.06	10.03
	Self-employment	72.83	75.2	68.49	81.82	70.93
	Unpaid family labour	19.62	19.11	19.86	12.12	19.05
Post-primary	Wage employment	19.88	45.83	52.05	40.0	36.54
	Self-employment	60.86	47.5	42.47	43.6	53.21
	Unpaid family labour	19.26	6.67	5.48	16.36	10.26

Source: Author's calculations based on GLSS4 data sets.

Age specific fertility rates for the three cases (no schooling, primary, post-primary) are shown in Figure 5. Education differences exist, such that the higher the education level, the lower the fertility. In line with theoretical expectations, schooling tends to play a crucial role in fertility decisions in general, and in the number of children that would be obtained in particular. Nationwide, fertility patterns indicate fewer children as higher levels of education are attained. Figure 5 shows that women with no schooling whatsoever have as many as 5.9 children by the time they are in the age 40–49 cohort. For this same older age cohort, however, women with post-primary education have, on average, about 3.5 children. Primary schooling, on the other hand, tends to represent

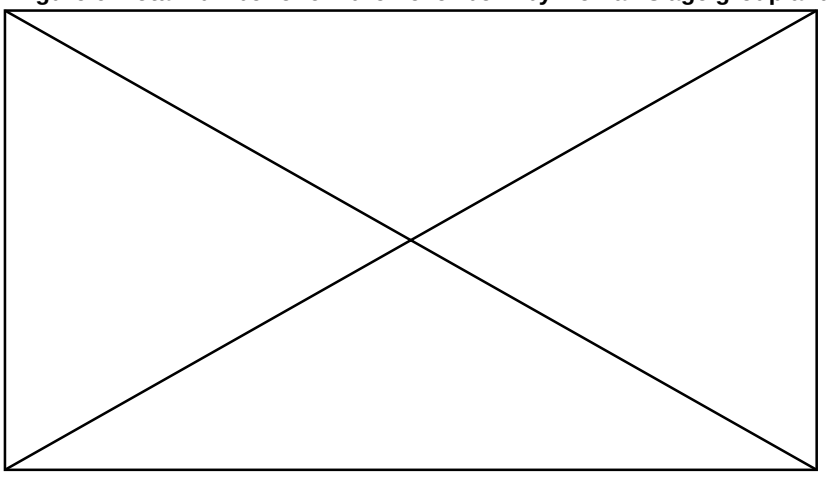
an intermediate situation with about 4.8 children. This gives credence to the assertion that fertility in Ghana is still relatively high.

Figure 5: Total number of children ever born by woman's age groups and education level (1998)



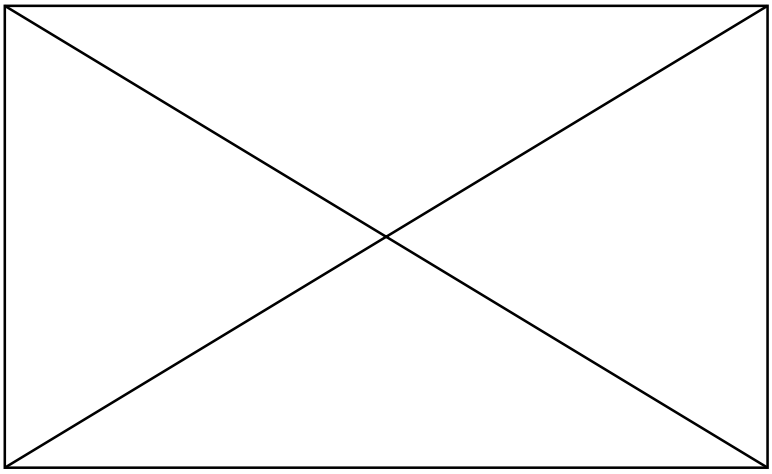
The average number of children ever born, as expected, is positively related to age, so that as one moves from younger age cohorts to older ones, the number of children born increases accordingly. Locality differences exist, however. By far the rural savannah locality appears to be leading in terms of fertility, with the average number of children born increasing from about 2.2 to 6.3 as women mature. The range for children borne by women in urban localities is from 2.1 to 5. The patterns for rural coastal and rural forest regions are shown in Figure 6. As observed earlier, the higher fertility among the age cohort 40–49 years reflects not just the fact that they have had time to complete their fertility, but also a cohort effect such that younger cohorts of women have fewer children.

Figure 6: Total number of children ever born by woman's age group and locality (1998)



Equally important in fertility discussions is the issue of contraceptive usage, which is seen in Figure 7 to rise among younger age cohorts, peak in the thirties and begin to fall as women move into older age brackets. Here again, the woman's education status seems to be a decisive factor in determining the probability of her ever using any modern contraceptive method. Although contraception usage is not high (i.e., an average of 12% for all sampled women), for all age cohorts some schooling results in increased contraception usage over no schooling. For those with no education, the highest percentage of usage is about 12% and occurs for women between 35 and 39 years of age. For those who have ever been to school this is about 25% and the relevant age group is 30–34 years.

Figure 7: Percentage of women having ever used contraceptives by age group and education status (1998)



The distribution of type of current contraception usage is shown in Table 3. As can be seen, only about 5% of all women are using the pill and 2.4% are using injection. Together with condom and intrauterine device (IUD) usage, we have no more than 9.4% of all women currently using a modern contraception method. This finding of lower modern contraception usage is similar to that of Ainsworth at al. (1996), who, using a different data set, found current usage of modern contraception methods to be 8% for all women in Ghana in 1993. With the exception of pill usage, urban contraception practices generally tend to surpass those of rural areas.

Table 3: Women's contraception usage, 1998 (%)

Contraception type	All sample	Urban sample	Rural sample
Pill	4.9	4.2	5.3
Condom	1.8	2.5	1.4
Intrauterine device	0.3	0.5	0.2
Injection	2.4	2.6	2.2
Abstinence	0.9	0.9	0.8
Other	3.5	3.4	3.6

Source: Author's calculations based on GLSS 4 data sets.

6. Model results and interpretation

In this section we present the results of estimations of two types of models – a probit model and a multinomial logit model. In the first instance we obtain results related to the marginal impact of a woman's education level, marital status and residence on her participation in the labour force. The second series gives us maximum likelihood estimates for specific employment options. These are detailed in the sections below.

Results from probit model on labour force participation

The marginal impact of respective right-hand-side variables on the probability of participation by women is shown in Table 4. A joint test on women's and their husband's primary and post-primary education levels shows that these are significantly different from zero at the 1% level (with a chi-square [4] of 20.6 and a p-value > 0.0004). The chi-squared tests also show that the relationships under consideration are not homogenous across the localities at the same level of significance.

The human capital variables for women (i.e., primary and post-primary education) are seen to be very significant in determining their labour market participation. In both urban and rural localities the woman's schooling exerts positive impacts on participation. This is in line with our theoretical expectations and attests to the fact that schooling in general and higher levels in particular increase the opportunity cost of women's time in household production. Although the point estimates for women's primary and post-primary schooling show the latter to be slightly higher, a joint test result for these two schooling levels for women shows that they are not significantly different from each other (i.e., chi-square [2] of 3.69 for urban and 3.75 for rural women with p-values > 0.16 and 0.15, respectively).

Women's marital status is significantly and positively associated with their probability of participation, irrespective of whether they reside in rural or urban areas. This is not surprising since it is common to see married women in Ghana being assisted financially by their husbands to engage in various economic activities. Some sort of household budget sharing occurs eventually, with such married women assuming financial responsibility for some specific household needs. Our data show that about 40% of married women in urban areas are engaged in wholesale and retail activities. An additional 20% are in small-scale manufacturing activities, mainly food processing. In rural areas, on the other hand, about 73% of married women engage in agriculture and livestock activities. The urban impact of being married on female participation

exceeds the rural by three times. For both urban and rural married women, the husband's post-primary schooling tends to have a significant positive effect on the probability of their participation.

Table 4: Marginal impact of covariates on female labour force participation in Ghana after probit estimation (1998)

Individual variables	Pooled sample		Urban sample		Rural sample	
	Coef.	z value	Coef.	z value	Coef.	z value
Woman's schooling [a]						
Primary	0.014	2.41*	0.030	1.69**	0.008	1.60
Post-primary	0.021	2.62*	0.047	1.92**	0.013	1.91**
Woman's age	0.003	1.80**	0.009	2.56*	-0.001	-0.37
Woman's age^2 (x10^{-2})	-0.005	-2.08*	-0.017	-2.79*	0.001	0.18
Household assets [b] (x10^{-4})	-0.103	-3.72*	0.087	0.46	-0.107	-4.14*
Non-labour income [c] (x10^{-6})	0.002	1.13	0.014	1.98*	-0.004	-1.60
Husband's schooling						
Primary	0.008	1.19	0.027	1.41	0.002	0.30
Post-primary	0.018	3.63*	0.040	3.26*	0.010	2.23*
Married [d]	0.023	3.93*	0.045	3.23*	0.015	2.53*
Woman's ethnicity [e]						
Akan	0.005	0.95	0.033	2.55*	-0.002	-0.46
Ga	0.010	1.71**	0.028	2.16*		
Ewe	0.010	1.52	0.014	1.02	0.024	2.86*
Hausa	0.004	0.28	-0.005	-0.18		
Woman's religion [f]						
Christian	0.003	0.31	-0.225	-8.54*	0.008	1.25
Muslim	0.006	0.66	-0.972	-7.78*	-0.005	-0.63
Other religion	0.014	1.43	-0.962	-6.03*	0.008	1.21
Woman's locality [g]						
Urban	-0.025	-3.95*				
Rural savannah	0.010	1.64			0.005	1.06
Rural forest	0.011	1.90**			0.007	1.77**
Log likelihood	-714.80		-440.47		-249.25	
LR chi^2	chi^2 (19)	178.49	chi^2 (16)		71.91 chi^2 (16)	66.27
Pseudo R-squared	0.111		0.076		0.117	
No. of observations	5,857		2,142		3,462	

Notes:
* and ** represent significance at the 5% and 10% levels, respectively.

a. Woman's schooling levels are dummy variables with a value of 1 if respective level is applicable, and a value of zero if otherwise. Excluded is the "no schooling" category.
b. The household asset variable is made up of equipment/tools/machinery, buildings and land. This is valued in local currency (i.e., 10,000 cedis).
c. Non-labour income comprises rental income and remittances. This is valued in local currency.
d. This is a dummy variable with a value of 1 if married, and zero otherwise.
e. Other ethnicity dropped.
f. Dropped from this category is traditional religion.
g. Rural coastal dropped.

Although women's residence is seen to be a significant determinant of participation, the coefficient for urban residence takes a surprisingly negative sign. Religion is only significant in urban areas, but tends to exert a negative impact on female participation. Age has a non-linear effect on female labour force participation, increasing at first and then decreasing later in life. This effect is statistically significant only for urban women.

Table 5 provides a comparison of the marginal impact of women's education levels and those of their husbands on their labour force participation for 1991 and 1998. For both years we do see that women's schooling matters in that it exerts a positive impact on participation (the only unexpected exception being primary schooling for urban women in 1991, which takes a negative sign, although statistically insignificant). For both urban and rural women, and in both years, we see that in the absence of husband's schooling we still have women's post-primary schooling being significant at the 5% level. The incorporation of husband's schooling effects augments female schooling effects with an increase in the marginal impact of female post-primary schooling. This increased effect is twice as high for urban women in 1998, and slightly higher for rural women. An examination of the correlation between a woman's education and that of her spouse shows a positive but not very strong association between them; the correlation coefficient is 0.34 for urban and 0.23 for rural localities. Nevertheless, this does not rule out the possibility of husband's education serving as proxy for family income not captured in the non-labour income variable. In such a case, the omission of spouse education would have biased the own education effects downward by picking up part of an income effect. This enhanced effect is not observed in the 1991 model results.

Table 5: Comparison between 1991 and 1998 marginal impact of women's education level and that of their husbands on their labour force participation

1998		**Probit model without husband's education**		**Probit model with husband's education**			
	Sample size	**Coefficient on woman's**		**Coefficient on woman's**		**Coefficient on husband's**	
		Primary	**Post-primary**	**Primary**	**Post-primary**	**Primary**	**Post-primary**
Overall	5,857	0.010*	0.012*	0.014*	0.022*	0.008	0.015*
Urban	2,395	0.017	0.025*	0.030**	0.053*	0.027	0.029*
Rural	3,462	0.007**	0.011*	0.008	0.012**	0.002	0.010*
1991							
Overall	4,363	0.027	0.053*	0.026	0.059*	0.079*	0.158*
Urban	1,669	-0.012	0.086*	-0.014	0.077*	0.054	0.135*
Rural	2,732	0.050	0.043**	0.050	0.043**	0.088*	0.240**

Note:
The coefficients are marginal impacts obtained after estimating probit models. The woman's age, residence, religion, assets, ethnicity and marital status have all been controlled for. See Appendix Table A2.
* and ** represent significance at the 5% and 10% levels, respectively.

By and large, our results appear to be quite robust. The directions of impact of the various coefficients are consistently the same; the magnitudes of impact are quite similar in both models, and variables that showed up as significant in Table 4 are again significant in Table 6. Given such consistencies, we limit our discussion here to the presence of children. Older children have a significant positive impact on overall female participation in general and that of urban women in particular. The impact of additional older children (defined here to be between the ages of 7 and 15 years) is relatively higher in urban centres, with a marginal impact of 0.027. The intuition

Table 6: Marginal impact of covariates on female labour force participation in Ghana after probit estimation with child variables included (1998)

Individual variables	Pooled sample		Urban sample		Rural sample	
	Coef.	z value	Coef.	z value	Coef.	z value
Woman's schooling						
Primary	0.014	2.41*	0.030	1.86**	0.008	1.58
Post-primary	0.022	2.78*	0.053	2.21*	0.012	1.91**
Woman's age	0.005	2.49*	0.014	3.11*	-0.001	-0.39
Woman's age^2 (x10^{-2})	-0.008	-2.63*	-0.023	-3.19*	0.001	0.23
Household assets (x10^{-4})	-0.098	-3.65*	0.078	0.45	-0.103	-4.01*
Non-labour income (x10^{-6})	0.002	1.18	0.013	1.98*	-0.004	-1.48
Husband's schooling						
Primary	0.008	1.29	0.027	1.60	0.002	0.29
Post-primary	0.015	2.95*	0.029	2.28*	0.010	2.25*
Married	0.018	3.06*	0.030	2.13*	0.015	2.47*
Woman's ethnicity						
Akan	0.005	0.92	0.030	2.43*	-0.003	-0.51
Ga	0.010	1.62	0.026	2.00*		
Ewe	-0.011	-1.60	0.012	0.89	0.024	2.89*
Hausa	0.003	0.26	-0.007	-0.23		
Woman's religion						
Christian	0.004	0.47	-0.214	-6.44*	0.008	1.34
Muslim	0.006	0.74	-0.970	-5.85*	-0.004	-0.60
Other religion	0.014	1.48	-0.964	-4.98*	0.008	1.25
Woman's locality						
Urban	-0.024	-3.90*				
Rural savannah	0.011	1.76**			0.005	1.08
Rural forest	0.011	2.04*			0.007	1.87**
Presence of children						
No. of children <=3	0.011	2.33*	0.033	2.66*	0.003	0.68
No. of children >=4	-0.017	-2.00*	-0.032	-1.48	-0.012	-1.47
Old child (7–15 years)	0.010	2.07*	0.027	2.31*	-0.001	-0.09
Log likelihood		-709		-433		-248
LR chi^2	chi^2(22)	190.00	chi^2(19)	86.12	chi^2(19)	68.44
Pseudo R-squared		0.118		0.090		0.121
No. of observations		5,857		2,142		3,462

Note: * and ** represent significance at the 5% and 10% levels, respectively.

behind this is that older children can help with home production and enable their mothers to have more time to participate in economic activities. Older children no longer require round the clock attention and also free their mother's time.

Having fewer children in urban areas tends to encourage participation, while more children does otherwise. This implies that urban women with fewer children are somewhat free from an otherwise protracted cycle of childbirth and care for a rather greater part of their age horizon. With fewer younger children to take care of, women are able to participate in labour market activities, given the relevant enabling environment. However, the presence of children appears not to matter as far as rural women's participation is concerned. It must be pointed out that in rural areas there seems to be relatively less conflict between women's role as caregiver and that of labour market activity pursuer because some forms of rural work allow supervision of children. For example, it is not uncommon to find rural women taking their children to the farm.We go beyond the reduced-form specification to examine the effects of children on participation. At the risk of running into simultaneity problems, our goal here is to see what difference children make in the participation decisions of women, while at the same time we hope to examine how robust our earlier results are given the addition of these child variables.

Results from multinomial logit on choice of employment type

Table 7 presents the marginal impact results from estimating our multinomial logit model on female employment sector choice. The maximum likelihood estimation has been done for the entire sample as well as separately for urban and rural samples, with a view to capturing insights from location differences on sector participation. Because the parameter estimates as provided by the multinomial logit models do not by themselves give us a sense of the marginal effects of the covariates on specific employment entrance probability, we have calculated these for all variables and presented the results in Table 7.

Wage employment as used in subsequent discussions does not necessarily imply formal sector employment, although the latter implies the former. Within the context of the Ghanaian economy most wage employment candidates tend to be in either the private formal or the public formal sector of the labour market. Self-employment, on the other hand, is used here to refer to all employment excluding wage employment and unpaid family labour. The exclusion of unpaid family labour from the definition of self-employment enables us to use this group of labour market participants as our base category in our multinomial logit model.

Following Glick and Sahn (1997), we conducted a series of Wald tests based on the estimated models for formal wage employment and self-employment.[1] The rationale was to examine the equality of the coefficients (or the slope parameter vectors) with the exception of the constant term. The test for equality of the various coefficients in the pooled model for the paired sectors (i.e., wage employment and self-employment) rejected the null hypothesis of equality. With a chi-squared value of 286.9 at 22 degrees

Table 7: Marginal impact of covariates on female employment choice in Ghana after multinomial logit estimation (1998)

Wage employment	**All women**		**Urban women**		**Rural women**	
	Coef.	z-value	Coef.	z-value	Coef.	z-value
Woman's schooling (years)	0.005	6.53*	0.009	4.18*	0.003	4.39*
Assets ($x10^{-3}$)	-0.008	-1.31	-0.066	0.54	0.016	-0.85
Non-labour income ($x10^{-6}$)	0.004	2.52*	0.005	1.25	0.002	1.91**
Woman's age	-0.003	-1.42	-0.014	-1.80**	0.001	1.06
Woman's age^2 ($x10^{-2}$)	0.004	1.21	0.020	182**	-0.003	-0.84
Married	0.049	1.38	0.064	1.85**	0.040	1.21
Woman's ethnicity						
Akan	-0.034	0.72	-0.068	2.08*	-0.022	0.01
Ga	-0.014	0.62	-0.018	2.48*	-0.028	-1.06
Ewe	0.021	0.57	0.076	2.14*	-0.015	-1.16
Hausa	-0.038	-0.15	-0.067	-0.88	0.021	0.91
Woman's religion						
Christian	0.082	2.19*	0.126	1.17	0.050	1.81**
Muslim	0.047	1.42	-0.004	1.35	0.076	1.33
Other religion	0.185	2.12*	0.257	2.00*	0.072	1.01
Woman's locality						
Urban	0.107	7.18*				
Rural savannah	-0.080	-4.86*			-0.056	-5.01*
Rural forest	-0.030	-2.18*			-0.025	-2.45*
Woman's schooling (years)	-0.002	]-3.19*	-0.006	-1.73**	0.003	-2.54*
Assets ($x10^{-3}$)	-0.022	-1.64	0.124	1.17	0.016	-2.83*
Non-labour income ($x10^{-6}$)	0.029	2.82*	0.005	1.20	0.002	2.97*
Woman's age	0.019	3.44*	0.031	3.42*	0.001	1.86**
Woman's age^2 ($x10^{-2}$)	-0.026	-2.76*	-0.048	-3.28*	-0.003	-1.17
Married	-0.075	-2.42*	-0.047	0.62	0.040	-3.07*
Woman's ethnicity						
Akan	0.099	4.07*	0.147	4.27*	-0.022	2.71*
Ga	0.052	1.80**	0.078	3.22*	-0.028	0.29
Ewe	-0.027	-0.51	-0.044	1.20	-0.015	-0.96
Hausa	0.074	0.80	0.038	-0.44	0.021	1.32
Woman's religion						
Christian	0.007	2.01*	-0.047	0.82	0.050	1.94*
Muslim	0.031	2.37*	0.084	2.12*	0.076	1.15
Other religion	-0.116	1.16	-0.178	1.64	0.072	0.57
Woman's locality						
Urban	-0.018	3.94*				
Rural savannah	-0.060	-4.68*			-0.056	-4.76*
Rural forest	0.001	-1.40			-0.025	-1.38
LR chi^2	chi^2 (32)	580	chi^2 (26)	127	chi^2 (30)	198
Log likelihood		-3321		-1417		-1875
Pseudo R^2		0.08		0.043		0.05
No. of observations		4,213		1,774		2,439

Note: Base category is unpaid family labour. * and ** represent significance at 5% and 10% levels, respectively.

of freedom and *p-value*>0.000, equality was rejected. A similar rejection of null hypotheses occurred for the urban and rural model specifications. These tests generally lend credence to the assertion that the labour market is not homogenous in that specific-sector entry prerequisites tend to differ.[2]

For both urban and rural women education is a significant determinant of employment. The marginal impact of schooling on wage employment choice is three times higher in urban than in rural areas, while for self-employment this impact is twice as high for urban women. Additional years of schooling result in a decline in self-employment and at the same time an increased tendency for wage employment. This may be more apparent than real, however, because the Ghanaian economy has witnessed a relative decline of wage employment compared with self-employment ever since the structural adjustment programme of the mid 1980s. Although most people (including women) prefer wage employment, most of which occurs in either the private formal sector or the public sector, the inability of these sectors to grow markedly appears to impair entrance into the sector irrespective of a person's education status. In fact, given the huge competition for the limited wage employment type of work, there seem to be higher education prerequisites for jobs that in the past were open to persons with relatively lower levels of education. It is also common knowledge that some employers sometimes tend to give preference to males rather than females, although in principle efforts are being made to ensure equity in employment practices.

Putting the labour market in context, we observe that unemployment increased from 4.7% in 1991 to 8.2% in 1998 for the entire economy. In terms of localities, urban unemployment increased from 11.3% to 13.4%, while rural unemployment rose from 1.7% to 5.5%. For all females, unemployment increased from 5.4% in 1991 to 8.7%.

It therefore appears that given the performance of Ghana's labour market, a significant expansion in female schooling may not necessarily lead to women's increased employment in the formal wage sector as suggested by our model. This is not to suggest that there is no need to encourage higher schooling attainments for females. On the contrary, this should be the case, but it needs to be accompanied by an expansion of job opportunities. For now, the probability of women's entry into employment is 0.24 for wage employment and 0.68 for self-employment in urban areas. In rural areas it is 0.07 for wage employment and 0.7 for self-employment. Assuming there is no hiring discrimination, given the fewer wage sector jobs available, it is the acquisition of higher schooling levels that will give women a competitive edge and enable them to obtain employment in this sector.

Cumulative fertility model results

This section presents results obtained from estimating our reduced form fertility model. Three models are estimated here: first, a purely reduced form model on fertility determinants; second, a re-estimation of the first model with the inclusion of a child survival variable; and third are-estimation of the second model using instruments for the child survival variable. The first two models are estimated by ordinary least squares (OLS), while the third is estimated by two-stage least squares method. Our F-tests indicate an overall significance of our pooled and locality disaggregated models

at the 5% level. In the second OLS specification, child survival rate is assumed to be exogenous and is seen to have a very significant effect in reducing the total number of children ever born to a woman. This assumption of exogeneity is later relaxed when child survival is treated as endogenous and appropriately identified by some community variables that represent the health environment. The instruments used include distance to hospital, community feeding programmes for school children, availability of clean water, schooling attainments of women and their spouses, availability of toilet facility, and availability of electricity. A joint F-test for the inclusion of these health environment variables gave a result of 5.66 for F(7, 4748) showing that the coefficients on these are statistically different from zero.

We acknowledge the issue of censoring in our fertility model, which is presented by the fact that in our sample some women of childbearing years may not have completed their fertility. Although it is difficult to deal with this issue, we do hope that the age covariates used in our specifications will help to control for such censoring bias.

We see from Table 8 that the coefficients on woman's schooling levels are negative, suggesting an inverse relationship between education and fertility. This is in line with our theoretical expectations and also the prevailing patterns in the Ghanaian economy. In terms of significance, it is women's post-primary schooling that reduces fertility in a significant manner, although in the urban model we do have primary schooling also being significant at the 10% level. Our model suggests that relative to no schooling, completion of post-primary level reduces the total number of children born by 0.8 for urban women and 0.7 for rural women. For both urban and rural localities, husband's post-primary education helps in the reduction of children born, the strongest marginal impact being felt in urban areas. However, given that about 43% of rural women and 23% of urban women have never been to school, pushing forward the goal of universal access to basic education will be a step in the right direction towards ensuring future decline in fertility. For married women in both localities, the husband's post-primary schooling reinforces the tendency towards reduced fertility.

Woman's urban residence or locality is negatively associated with fertility and is quite significant. For rural women, residence does not seem to matter, as this shows up as being insignificant. The negative relationship between fertility and urban residence is also not surprising and was found in some earlier studies that used 1987/88 data on Ghana, such as Montogomery and Oliver (1995). Lower fertility preference in urban areas could be the result of relatively higher costs of child education in such localities and the need to ensure some quality education for children.

Evidence from the 1998/99 living standards survey shows that schooling expenses are twice as much in urban as in rural localities. Unlike rural localities, where children generally attend public schools, there are private school options available in urban localities but these involve higher payments. It is therefore not surprising that our data show that school fees and registration are about four times higher in urban areas, parent–teacher association fees are about two times higher, books and school supplies are 3.5 times higher, and payments for extra classes are 4.5 times higher. These patterns generally hold even after correcting for cost of living differentials. Generally, in such an environment child quality preference seems to go with reduced fertility preference, hence the significantly lower fertility observed for women in urban areas.

Table 8: Pooled and locality disaggregated reduced form fertility models for ever-married women in Ghana (1998)

Variables	Pooled sample		Urban sample		Rural sample	
	Coef.	t-value	Coef.	t-value	Coef.	t-value
Woman's schooling [a]						
Primary	-0.390	-1.99*	-0.597	-1.83**	-0.305	-1.26
Post-primary	-0.755	-4.27*	-0.823	-2.78*	-0.742	-3.39*
Woman's age	0.355	5.27*	0.242	2.13*	0.394	4.72*
Woman's age^2 (x10^{-2})	-0.289	-3.08*	-0.149	-0.94	-0.337	-2.90*
Household assets (x10^{-3}) [b]	0.082	0.77	0.249	1.99*	-0.197	-1.14
Non-labour income (x10^{-6}) [c]	-0.126	-2.08*	-0.080	-1.17	-0.254	-2.39*
Husband's schooling						
Primary	-0.244	-1.13	-0.154	-0.38	-0.274	-1.06
Post-primary	-0.391	-4.62*	-0.443	-3.18*	-0.358	-3.40*
Woman's ethnicity [d]						
Akan	-0.081	-0.65	-0.274	-1.27	-0.015	-0.10
Ga	-0.186	-0.07	-0.259	-1.01	-0.223	-0.92
Ewe	-0.488	-3.29*	-0.424	-1.51	-0.561	3.13*
Hausa	-0.074	-0.20	-0.165	-0.41	0.166	0.22
Woman's religion [e]						
Christian	-0.444	-2.72*	-2.188	-3.09*	-0.376	-2.13*
Muslim	-0.382	-2.10*	-2.280	-3.09*	-0.289	-1.40
Other religion	-0.221	-1.00	-1.819	-2.33*	-0.192	-0.78
Woman's locality [f]						
Urban	-0.801	-6.47*				
Rural savannah	-0.068	-0.45			-0.048	-0.29
Rural forest	-0.013	-0.11			-0.037	-0.29
Intercept	-3.082	-2.54*	0.227	0.11	-3.933	-2.61*
F statistic	F(18, 2812)	47.65	F(15, 848)	15.97	F(17, 1949)	31.34
Adj. R-squared		0.229		0.207		0.208
No. of observations		2,831		864		1,967

Notes:
* and ** represent significance at the 5% and 10% levels, respectively.
a. Woman's schooling levels are dummy variables with a value of 1 if respective level is applicable, and a value of zero otherwise. Excluded is the "no schooling" category.
b. Household asset variable is made up of equipment/tools/machinery, buildings and lands. This is valued in local currency (i.e., ten thousands).
c. Non-labour income is made of rental income and remittances. This is valued in local currency.
d. Other ethnicity dropped.
e. Dropped from this category is traditional religion.
f. Rural forest dropped.

Woman's age has a non-linear effect on the number of children born. The household asset variable is only significant for urban women, and is seen to bear a positive sign. This seems to suggest that improvements in household worth, as reflected in increases in real asset value, tend to increase the number of children born, although negligibly. Possibly, such enhancement in assets increases households' capacity to support schooling for additional children. Non-labour income, however, is significant through all specifications, and has a negative but very small impact on fertility. It therefore

appears that the overall net effect of such income-related variables on fertility depends on the relative strengths from the assets variable and non-labour income variable.

Ethnicity does not seem to be a significant determinant of fertility. The relationship between religion and fertility is a mixed one and depends on the woman's locality. For urban women this is quite significant for all religions, while for rural women only Christianity tends to be a significant variable in reducing the total number of children born to a woman.

The inclusion of the child survival variable and subsequent re-estimation of the earlier model give fairly robust results for the schooling, income, age, locality and religion variables. One major difference in the model results shown in Table 9 is the non-statistical significance of urban women's primary schooling on fertility.

Table 9: Pooled and locality disaggregated fertility models with child survival rate included (1998)

Variables	Pooled sample		Urban sample		Rural sample	
	Coef.	t-value	Coef.	t-value	Coef.	t-value
Woman's schooling						
Primary	-0.370	-1.91**	-0.504	-1.55	-0.348	-1.46
Post-primary	-0.702	-4.03*	-0.723	-2.44*	-0.735	-3.42*
Woman's age	0.355	5.35*	0.259	2.30*	0.380	4.64*
Woman's age^2 (x10^{-2})	-0.296	-3.20*	-0.175	-1.11	-0.327	-2.86*
Household assets (x10^{-3})	0.099	0.95	0.252	2.03*	-0.161	-0.95
Non-labour income (x10^{-6})	-1.290	-2.10*	-0.085	-1.25	-0.248	-2.30*
Husband's schooling						
Primary	-0.199	-0.93	-0.054	-0.13	-0.274	-1.08
Post-primary	-0.407	-4.88*	-0.449	-3.24*	-0.380	-3.67*
Woman's ethnicity						
Akan	0.068	-0.55	0.257	-1.20	0.010	0.06
Ga	-0.138	-0.81	-0.214	-0.84	-0.170	-0.71
Ewe	-0.436	2.98*	-0.369	1.32	-0.508	2.88*
Hausa	-0.040	-0.11	-0.141	-0.35	0.133	0.18
Woman's religion						
Christian	-0.402	-2.40*	-2.153	-3.00*	-0.321	-1.80**
Muslim	-0.397	-2.22*	-2.246	-3.06*	-0.333	-1.64
Other religion	-0.193	-0.80	-1.779	-2.29*	-0.160	-0.60
Woman's locality						
Urban	-0.699	-5.71*				
Rural savannah	-0.070	-0.48			-0.038	-0.24
Rural forest	0.065	0.54			0.047	0.38
Child survival rate [a]	-0.018	-9.24*	-0.011	-3.31*	-0.021	-8.61*
Intercept	-1.507	-1.25	0.834	0.39	-1.818	-1.21
F-statistic	F(19, 2811)	50.99	F(16, 847)	15.83	F(18, 1948)	34.83
Adj. R-squared		0.251		0.216		0.237
No. of observations		2,831.0		864.0		1,967.0

Notes:
* and ** represent significant at the 5% and 10% levels respectively.
a. We follow Montgomery et al. (1995) in defining child survival rate to be the number of children still alive as a percentage of the total number of children ever born.

The child survival rate, as expected, has a strong significant negative effect on fertility in all localities. It is interesting to note that effects of the child survival rate are stronger in rural than in urban areas. An additional percentage improvement in child survival rates reduces rural fertility by 0.02 births and urban fertility by 0.01 births. Given the general concern of high fertility levels in the country in general, and rural areas in particular (as seen in Figure 6), such a finding has important policy implications and could become an important factor in Ghana's demographic transition. This underscores the importance of the health environment.

The 1998 Ghana Living Standards Survey shows a gap between urban and rural Ghana in the prevailing health environments. The incidence of community feeding programmes in schools is higher in urban (25.3%) than in rural (20.2%) areas. If child nutritional status is augmented by such programmes, then urban children will appear to be in a more favourable situation than rural children. Among rural localities, rural savannah appears to be worse off, with only 16% occurrence of such nutritional enhancement programmes for school children. For children not more than seven years old, 96% of those in urban areas have been vaccinated in recent times against such childhood diseases as measles, polio and diphtheria. In rural areas the vaccination incidence is 90%. Also, whereas access to sanitation facilities in the country is relatively lower than the average for developing countries, the problem is more acute in rural than urban areas. Our data show that about 8% of women in urban localities have no toilet facility whatsoever, while as many as 28% of rural women are in such a situation.

In Table 10, we present results of our fertility model using the instrumental variable technique. As is usually the case, the selection of appropriate instruments is a difficult task since these instruments must be highly correlated with the potentially endogenous variable in question (i.e., child survival rate) so as to produce reliable predictions of it. The first stage result of this technique is shown in Appendix Table A3. The results obtained in Table 10 are comparable to those obtained from the OLS estimation shown in Table 9. The two sets of results are similar in terms of direction of effects, but differ in terms of magnitude of impact.

We apply the Hausman test to ascertain the exogeneity or otherwise of the child survival rate variable. This is conducted in two stages. In the first stage a model of child survival rate is estimated and in the second stage the fitted or predicted value of the child survival variable obtained in the first step is included in the fertility model estimated in Table 9 and the model is re-estimated. The outcome of this re-estimation is shown in Table 11. Our null hypothesis is that the child survival rate variable is exogenous, while the alternative hypothesis is that it is not exogenous. Since only one variable's exogeneity is being tested, this reduces to a simple t-test on the coefficient on the predicted child survival rate variable.

The test results given in Table 11 support the exogeneity of the child survival variable for our urban and rural models. The t-values for the predicted child survival variable for these locality disaggregated models are significant at neither the 5% nor the 10% levels. The pooled model, however, puts some caution on the test outcome in that although the predicted child survival variable is not significant at the 5% level, it is so at the 10% level. Since our earlier statistical tests supported non-pooling of localities, we are inclined to go cautiously with the results from our urban and rural specifications (i.e., the child survival variable could be considered as exogenous).

Table 10: Instrumental variable estimation of pooled and locality disaggregated fertility model for ever-married women in Ghana (1998)

Variables	Pooled sample		Urban sample		Rural sample	
	Coef.	t-value	Coef.	t-value	Coef.	t-value
Woman's schooling						
Primary	-0.276	-1.37	-0.066	-0.36	-0.220	-0.89
Post-primary	-0.524	-2.63*	-0.687	-3.59*	-0.553	-2.28*
Woman's age	0.345	5.12*	0.251	2.23*	0.381	4.55*
Woman's age^2 (x10^{-2})	-0.289	-3.08*	-0.178	-1.13	-0.330	-2.84*
Household assets (x10^{-3})	0.104	0.98	0.274	2.20*	-0.165	-0.95
Non-labour income (x10^{-6})	-0.114	-1.87**	-0.054	-0.79	-0.237	-2.21*
Husband's schooling						
Primary	-0.073	-0.32	0.438	1.46	-0.134	-0.50
Post-primary	-0.334	-3.81*	-0.426	-3.01*	-0.303	-2.77*
Woman's ethnicity						
Akan	-0.047	-0.38	-0.184	-0.86	0.015	0.09
Ga	-0.145	-0.18	-0.098	-0.38	-0.210	-0.86
Ewe	-0.459	-3.08*	-0.309	-1.10	-0.536	-2.98*
Hausa	-0.054	-0.15	-0.184	-0.46	0.180	0.24
Woman's religion						
Christian	-0.256	-1.43	-1.673	-2.32*	-0.212	-1.06
Muslim	-0.335	-1.83**	-1.946	-2.64*	-0.251	-1.21
Other religion	-0.188	-0.85	-1.476	-1.90**	-0.164	-0.66
Woman's locality						
Urban	-0.613	-4.24*				
Rural savannah	-0.143	-0.94			-0.115	-0.67
Rural forest	-0.014	-0.11			-0.038	-0.31
Child survival (predicted)	-0.060	-2.50*	-0.068	-1.94**	-0.054	-1.78**
Intercept	2.190	0.90	5.279	1.40	0.860	0.28
F-statistic	F(19,2811)	45.56	F(16, 847)	15.95	F(18, 1948)	29.81
Adj. R-squared		0.23		0.207		0.209
No. of observations		2,831.0		864.0		1,967.0

Notes:
* and ** represent significance at the 5% and 10% levels, respectively.

The results also show that the use of OLS in estimating the fertility models is to a large extent acceptable. The outcome of our Hausman test could be compared with a similar study by Benefo and Schultz (1996) on Ghana (using 1987/88 household survey data), since both revolve around the issue of child morbidity. In their study, the morbidity indicator whose exogeneity was being tested was the child mortality rate, while in our case it is child survival. Their test result also showed that the child mortality variable was exogenous.

Results from estimations of the effects of women's schooling on fertility with and without that of their husbands' education in 1991 and 1998 are shown in Table 12 for a comparative analysis. As expected, women's primary and post-primary schooling levels in both years result in a reduction in the total number of children ever born. In

both years post-primary education is more significant in reducing fertility. Without husband's schooling effects, the marginal impacts of female post-primary schooling (relative to no schooling) on fertility are higher in 1991 than 1998 for urban women (i.e., 0.85 and 0.72), but lower in 1991 than 1998 for rural women (i.e., 0.42 and 0.55). With husband's schooling effects included, the marginal impact of female post-primary schooling in 1998 rises by about 14% for urban women and 35% for rural women. In 1991, we observe surprising reductions in the female post-primary schooling effect by about 6% for urban women and 5% for rural women.

Table 11: Exogeneity test for child survival rate

Variables	Pooled sample		Urban sample		Rural sample	
	Coef.	t-value	Coef.	t-value	Coef.	t-value
Woman's schooling						
Primary	-0.286	-1.45	-0.047	-0.26	-0.290	-1.19
Post-primary	-0.532	-2.71	-0.710	-3.74	-0.606	-2.54
Woman's age	0.348	5.23	0.268	2.40	0.371	4.51
Woman's age^2 (x10^{-2})	-0.296	-3.20	-0.200	-1.28	-0.322	-2.82
Household assets (x10^{-3})	0.115	1.10	0.275	2.22	-0.139	-0.82
Non-labour income	-0.120	-2.01	-0.061	-0.89	-0.236	-2.25
Husband's schooling						
Primary	-0.074	-0.33	0.454	1.52	-0.178	-0.67
Post-primary	-0.364	-4.22	-0.446	-3.16	-0.342	-3.17
Woman's ethnicity						
Akan	-0.043	-0.35	-0.174	-0.81	0.031	0.20
Ga	-0.109	-0.63	-0.673	-0.26	-0.162	-0.68
Ewe	-0.416	-2.83	-0.257	-0.92	-0.491	-2.78
Hausa	-0.026	-0.07	-0.165	-0.41	0.143	0.19
Woman's religion						
Christian	-0.264	-1.49	-1.701	-2.37	-0.208	-1.07
Muslim	-0.363	-2.01	-1.943	-2.66	-0.307	-1.50
Other religion	-0.169	-0.77	-1.465	-1.90	-0.140	-0.58
Woman's locality						
Urban	-0.562	-3.94				
Rural savannah	-0.125	-0.83			-0.084	-0.50
Rural forest	0.063	0.53			0.045	0.37
Child survival rate	-0.012	-9.08	-0.012	-3.40	-0.021	-8.51
Child survival rate (Predicted)	-0.042	-1.83**	-0.053	-1.53	-0.033	-1.16
Intercept	2.353	0.98	4.697	1.25	1.454	0.48
F statistic		48.65		33.09		33.09
Adj. R-squared		0.257		0.237		0.244
No. of observations		2,831.0		864.0		1,967.0

** Significance at the 10% level.

Table 12: Comparison between 1991 and 1998 impact of women's education level and that of their husband's on the total number of children born

1998		**Regression without husband's education**		**Regression with husband's education**			
	Sample size	**Coefficient on woman's**		**Coefficient on woman's**		**Coefficient on husband's**	
		Primary	**Post-primary**	**Primary**	**Post-primary**	**Primary**	**Post-primary**
Overall	2,831	-0.246**	-0.586*	-0.390*	-0.755*	-0.244	-0.391*
Urban	864	-0.517**	-0.723*	-0.597**	-0.823*	-0.154	-0.443*
Rural	1,967	-0.136	-0.548*	-0.305	-0.742*	-0.274	-0.358*
1991							
Overall	2,636	-0.048	-0.620*	-0.032	-0.582*	0.170	-0.770*
Urban	866	0.092	-0.854*	0.098	-0.807*	-0.036	-0.520*
Rural	1,770	-0.081	-0.415*	-0.063	0.393*	0.423	-1.027

Notes:

a. The coefficients were obtained from ordinary least squares estimation of the reduced form fertility models. The woman's age, residence, religion, assets, ethnicity and marital status have all been controlled for. See Appendix Table A2 for details.

b. * and ** represent significance at the 5% and 10% levels, respectively.

7. Conclusions and policy implications

The role of women in the development of the Ghanaian economy cannot be overemphasized. In virtually all spheres of life, women are seen contributing to the overall output of the economy. Indeed, their ability to blend household demands with labour market activities has been a remarkable phenomenon, one that has attracted the attention of an emerging literature on gender dynamics. This paper, in an attempt to add to this growing literature, sought to model female labour force participation and fertility in Ghana with a focus on the role of education using demographically enriched household living standard surveys.

Our study shows that female labour force participation rates are quite high in the Ghanaian economy. The type of sector women find themselves in tends to be associated with their level of education, but the majority are in self-employment. Evidence from the 1991 and 1998 household living standards surveys shows that wage employment for females is no more than 10% of total employment. By far, agriculture is the dominant industry absorbing the female labour force. This is not surprising since Ghana is a predominantly agricultural economy with the bulk of the populace in rural areas.

Fertility levels in the Ghanaian economy, although relatively high, appear to be declining over time. The interplay of sustained efforts at improving literacy levels, especially of the girl-child, participation in labour market activities, the availability of health services and the emergence of family planning services have all worked towards reducing the total fertility rate in the country. Improvements in the educational status of females (in terms of both enrolment and years of schooling) as well as the tendency towards later marriage have been crucial to fertility reduction.

Female education attainments matter. In both probit and multinomial logit models on female labour participation, our study shows that education of females exerts a positive impact on their participation in the labour market. The opposite situation occurs in the fertility models, where education results in a reduction in the number of children ever born to a woman. These results have important policy implications. Given the current concerns about the plight of women in the country, it can be argued that providing them with education would be a useful investment and a good mechanism for the realization of their empowerment. With an enhancement in their human capital, they will be better equipped to participate in a more productive way in the labour market. This process appears to be in motion, and the gender gap in education is closing. The implication of this is that as more females get educated and acquire more skills, they will increase their employability in the formal labour market, with favourable impacts on their perceptions of ideal family size and fertility preference. It is important, however, to ensure that the educational gains are sustained.

The child health environment is also seen to be very important in reducing fertility. Improving the child survival rate reduces fertility levels in both urban and rural areas in a remarkable way. The implications for policy are substantial. Government policy efforts at child immunization, community feeding programmes and malaria awareness campaigns, among others, need to be sustained and intensified to ensure reductions in fertility and improvements in well-being of females in particular and their families in general. More effort needs to be put into closing the health care gap between rural and urban localities.

Notes

1 The Wald test is based on an estimator that is asymptotically normally distributed. Under the null hypothesis, the Wald statistic has an asymptotic chi-squared (q) distribution, where q is the number of restrictions under the null hypothesis. Given b as the estimated coefficient vector, V as the variance-covariance matrix and $Rb=r$ as the set of q linear hypotheses to be tested jointly, the Wald test statistic (W) takes the form: $W= (Rb-r)'(RVR')^{-1}(Rb-r)$. See Stata Corporation (2001).

2 Hypotheses being considered under the Wald test were as follows:
- H_o: Coefficients on variables in the wage employment model are the same as in the self-employment model.
- Ha: These coefficients are different from each other.

Three such tests were conducted, one each for the pooled model, urban model and rural model. The respective results were as follows:
- Pooled model: Chi-squared value of 210.7 with 16 degrees of freedom; *p-value*>0.000
- Urban model: Chi-squared value of 64.0 with 13 degrees of freedom; *p-value*>0.000
- Rural model: Chi-squared value of 43.6 with 15 degrees of freedom; *p-value*>0.0001

References

Addison, T. 1993. "Employment and earnings". In L. Demery, M. Ferroni, C. Grootaert and J. Wong-Valle, eds., *Understanding the Social Effects of Policy Reform.* Washington, D.C.: The World Bank.

Ainsworth, M., K. Beegle and A. Nyamete. 1996. "The impact of women's schooling on fertility and contraceptive use: A study of fourteen Sub-Saharan African countries". *The World Bank Economic Review*, 10(1): 85–122.

Benefo, K. and T.P. Schultz. 1996. "Fertility and child mortality in Côte d'Ivoire and Ghana". *The World Bank Economic Review*, 10(1):123–58.

Ben-Porath, Y. 1973. "Labour-force participation rates and the supply of labor". *Journal of Political Economy*, 81: 697–704.

Collier, P., A.C. Edwards, J. Roberts and K. Bardhan. 1994. "Gender aspects of labour allocation during structural adjustment". In S. Horton, R. Kanbur and D. Mazumdar, eds., *Labor Markets in an Era of Adjustment*, Vol. 1, Issues Papers. EDI Development Studies. Washington, D.C.: The World Bank.

Dwyer, J.W. and R.T. Coward, eds. 1992. *Gender, Families and Elder Care.* London: Sage Publications.

Edwards, A.C. and S. Edwards. 1994. "Labour market distortions and structural adjustment in developing countries". In S. Horton, R. Kanbur and D. Mazumdar, eds., *Labor Markets in an Era of Adjustment*, Vol. 1, Issues Papers. EDI Development Studies. Washington, D.C.: The World Bank.

Fosu, A.K. 1999. "Cost of living and labor force participation: Married women in urban labor markets". *Journal of Labor Research*, XX(2): 219–32.

Glick, P. and D.E. Sahn. 1997. "Gender and education impacts on employment and earnings in West Africa: Evidence from Guinea". *Economic Development and Cultural Change*, 45(4): 793–823.

Ghana Statistical Services. Various issues. *Quarterly Digest of Statistics.* Accra.

Heckman, J. 1974. "Shadow prices, market wages and labor supply". *Econometrica*, 42(4): 679–94.

Lam, D. and S. Duryea. 1999. "Effects of schooling on fertility, labour supply and investments in children, with evidence from Brazil". *The Journal of Human Resources*, 34(1): 160–92.

Mackellar, L. and R. Bird. 1997. "Global population ageing, social security and economic growth: Some results from a 2-regional model". Paper presented to Project LINK meeting. New York, 24 March.

Mammen, K. and C. Paxson. 2000. "Women's work and economic development". *Journal of Economic Perspectives*, 14(4): 41–64.

McCabe, J.L. and M.R. Rosenzweig. 1976. "Female labour force participation, occupational choice and fertility in developing countries". *Journal of Development Economics*, 3: 141–60.

Montgomery, M., A. Kouame and R. Oliver. 1995., "The tradeoff between number of children and child schooling: Evidence form Cote d'Ivoire and Ghana". LSMS Working Paper Number 112, The World Bank, Washington, D.C,.

Rosenzweig, M.R. and T.P. Schultz. 1985. "The demand for and supply of births: Fertility and its life cycle consequences". *The American Economic Review*, 75(5, Dec.): 992–1015.

Rosenzweig, M.R. and K.I. Wolpin. 1980. "Life-cycle labour supply and fertility: Causal inferences from household models". *The Journal of Political Economy*, 88(2): 328–48.

Schultz, T.P. 1994. "Human capital, family planning and their effects on population growth". *The American Economic Review*, 84(2): 255–60.

Sloane, P.J. and I. Theodossiou. 1996. "Earnings mobility, family income and low pay". *The Economic Journal*, 106(436, May): 657–66.

Sprague, A. 1988. "Post-war fertility and female labour force participation rates". *The Economic Journal*, 98(392): 682–700.

Stata Corporation. 2001. *Stata Reference Manual: Release 7*, Vol. 2 H-P. College Station, Texas: Stata Press.

Strauss, J. 1993. "The impact of improved nutrition on labour productivity and human resource development: An economic perspective". In P. Pinsteup-Andersen, ed., *The Political Economy of Food and Nutrition Policies.* Baltimore, Maryland: Johns Hopkins University Press.

Strauss, J. and D. Thomas. 1995. "Human resources: Empirical modeling of household and family decisions". In J. Behrman and T.N. Srinivasan, eds., *Handbook of Development Economics*, Vol. IIIA. Amsterdam: Elsevier.

UNESCO. 2004. Online statistical tables on education, http//www.uis.unseco.org

Van der Klauw, W. 1996. "Female labour supply and marital status decisions: A life-cycle model". *The Review of Economic Studies*, 63(2): 199–235.

Willis, R. 1973. "A new approach to the economic theory of fertility behaviour". *Journal of Political Economy*, 81(S): 14–64.

Wolfe, B.L., J.R. Beheman and D.M. Blau. 1982. "The impact of demographic changes on income distribution in a developing country". *Journal of Development Economics*, 11: 355–77.

World Bank. 1995a. *Regional Perspectives on World Development Report 1995: Labour and Economic Reforms in Latin America and the Caribbean.* Washington, D.C.: The World Bank.

World Bank. 1995b. *Toward Gender Equality: The Role of Public Policy.* Washington, D.C.: The World Bank.

World Bank. 2001. "2001 World Bank Africa Database CD-Rom". Washington, D.C.

Appendix: Supplementary tables

A1: Probit model: Marginal impact of covariates on probability of female labour force participation (1991)

Individual variables	Pooled sample		Urban sample		Rural sample	
	Coef.	Z value	Coef.	z value	Coef.	z value
Woman's schooling						
Primary	0.026	0.99	-0.014	-0.28	0.050	1.60
Post-primary	0.049	2.59*	0.077	2.43*	0.043	1.77**
Woman's age	-0.016	-2.09*	-0.009	-0.70	-0.023	-2.35*
Woman's age^2 (x10^{-2})	0.026	2.11*	0.012	0.62	0.039	2.48*
Household assets (x10^{-2})	0.021	0.85	-0.017	-0.34	0.045	0.85
Non-labour income (x10-^{6})	0.162	2.63*	0.243	2.92*	-0.009	-0.08
Husband's schooling						
Primary	0.079	2.38*	0.054	1.05	0.088	2.01*
Post-primary	0.158	3.32*	0.135	2.58*	0.240	1.94**
Married	0.041	1.49	0.062	1.52	0.026	0.69
Woman's ethnicity						
Akan	0.044	2.06*	-0.010	-0.27	0.062	2.34*
Ga	0.097	3.09*	-0.302	-0.37	0.229	4.81*
Ewe	0.036	1.31	-0.038	-0.84	0.074	2.17*
Hausa	0.084	1.47	0.076	1.12	-0.006	-0.05
Woman's religion						
Christian	0.116	1.59	0.115	1.32	0.048	0.34
Muslim	0.060	0.79	0.097	1.06	-0.034	-0.24
Other religion	0.156	2.02*	0.169	1.80**	0.080	0.54
Woman's locality						
Urban	-0.041	-1.64				
Rural savannah	-0.098	-3.33*			-0.074	-2.38*
Rural forest	0.062	2.37*			0.085	3.18*
Log likelihood	-2,951		-1,137		-1,823	
LR Chi^2	145		39		140	
Pseudo R-squared	0.024		0.017		0.037	
No. of observations	4,363		1,669		2,732	

Notes: * and ** represent significance at the 5% and 10% levels, respectively.

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Table A2: Pooled and locality disaggregated reduced form fertility models for ever-married women (1991)

Variables	Pooled sample		Urban sample		Rural sample	
	Coef.	t-value	Coef.	t-value	Coef.	t-value
Woman's schooling						
Primary	-0.032	-0.26	0.098	0.45	-0.063	-0.43
Post-primary	-0.582	-6.48*	-0.807	-5.64*	-0.393	-3.40*
Woman's age	0.302	6.56*	0.243	3.19*	0.296	5.16*
Woman's age^2	-0.175	-2.52*	-0.124	-1.10	-0.147	-1.69**
Household assets	-0.001	-1.42	-0.002	-0.66	-0.001	-1.38
Non-labour income (x10^{-6})	-0.368	-1.22	-0.345	-1.14	-0.285	-0.36
Husband's schooling						
Primary	0.170	0.55	-0.036	-0.11	0.423	0.53
Post-primary	-0.770	-2.61*	-0.520	-1.75**	-1.027	-1.30
Woman's ethnicity						
Akan	0.031	0.30	0.154	0.91	0.177	1.36
Ga	-0.378	-2.45*	-0.643	-3.04*	0.052	0.22
Ewe	-0.009	-0.07	-0.138	-0.65	0.080	0.48
Hausa	0.754	2.84*	0.677	2.29*	0.148	0.28
Woman's religion						
Christian	-0.572	-1.20	-0.345	-0.49	-0.554	-0.89
Muslim	-0.430	-0.91	-0.417	-0.59	-0.250	-0.40
Other religion	-0.344	-0.64	0.070	0.09	-0.692	-0.95
Woman's locality						
Urban	-0.538	-4.50*				
Rural savannah	-0.378	-2.75*			-0.174	-1.15
Rural forest	0.176	1.46			0.198	1.55
Intercept						
F statistic		90.20		32.57		66.93
Adj. R-squared		0.379		0.354		0.388
No. of observations		2,636		866		1,770

Note: * and ** represent significance at the 5% and 10% levels, respectively.

Appendix Table A3: Child survival rate model (1998)

Variables	Coef.	t-value
Woman's schooling [a]		
Primary	1.561	0.98
Post-primary	3.418	2.55*
Woman's age (years)	-0.155	-3.64*
Husband's schooling [a]		
Primary	2.598	1.66**
Post-primary	1.237	2.14*
Health environment		
Hospital distance	-0.297	-1.67**
Natural water source [b]	-1.471	-2.14*
Community feeding programme [c]	0.901	1.46
No toilet available [d]	-1.742	-2.13*
Food expenditures ($x10^{-5}$) [e]	0.055	3.38*
Electricity availability [f]	1.745	2.26*
Immunization campaign [g]	0.818	0.80
Rural locality (dummy)	-1.955	-1.77**
Religion [h]	2.149	3.43*
Ethnicity [i]	-0.473	-0.77
Intercept	89.972	40.46*
F-statistic	F(15, 4764)	9.60
Adjusted R^2		0.026
No. of observations		4,764

Notes:
* and ** represent significance at the 5% and 10% levels, respectively.
a: Schooling levels for women and their husbands' are dummy variables with a value of 1 if respective level is applicable, and a value of zero if otherwise. Excluded is the "no schooling" category.
b: If sources of drinking water are rivers, springs, lakes and rain water, the dummy variable takes a value of 1; otherwise it has a zero value.
c: This is a dummy variable with a value of 1 if there is a school feeding programme in existence in the relevant community. The variable assumes a zero value if no such programme exists.
d: This is a dummy variable with a value of 1 if there is no toilet facility available. For availability of flush toilet, pit latrine, pan or bucket, or KVIP facility, the variable assumes a zero value.
e: Food expenditure variable is valued in local currency and represents both actual and imputed values for annual household disbursements on food.
g: This takes a value of 1 if there has been a community immunization campaign, and zero if otherwise.
h: This takes a value of 1 if Christian, and zero if otherwise.
i: Being an Akan takes a value of 1, and zero if otherwise.

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